using inspecting apparatus to:

irradiate light, a laser beam, or a charged particle beam onto a substrate;

detect a signal which is generated from said substrate by said irradiation;

extract a defect on said substrate on the basis of the signal detected;

execute an inspection of said substrate;

extract a defect at the end of a predetermined manufacturing step among a plurality of manufacturing steps of forming a circuit pattern onto said substrate; and

establish a mark at a location near to a position of the defect;

transmit the result of the inspection including the defect and the mark to observing apparatus; and

using the observing apparatus to:

irradiate[s] a charged particle beam onto said substrate;

detect a signal which is generated from said substrate by said irradiation;

display an image of said substrate on the basis of the signal detected; and

locate the defect existing on said substrate or a part thereof using said mark.

REMARKS

Claims 1-5 and 9-12 remain in this application. Claims 6-8 have been cancelled without prejudice. Claims 1-5 and 9 have been amended to better bring out features of Applicants' invention. Claims 10-12 are new method claims corresponding respectively to claims 1, 5, and 9.

Claims 1-3 are rejected as anticipated by Meisberger et al., claims 4 and 5 as obvious over Meisberger et al. in view of Muller et al. Claim 9 is rejected as obvious over Inokuchi. Applicants' respectfully traverse these rejections and believe that, as amended, the claims clearly define over the art.

The Examiner is thank for granting the undersigned and the Japanese representative of Applicants, Mr. Sawahata, an interview on February 21, 2002. At the interview, the Examiner pointed out that a number of features being relied upon to support patentability were not structural limitations. As a result of these comments, Applicants have expressed the limitations as additional apparatus limitations and in some cases have also presented parallel method claims.

As originally presented, claim 1 claimed "a size of each pixel of an image ... is set irrespective of a beam diameter of the charged particle beam." Although this feature is not directly disclosed in the cited reference to Meisberger et al., claim 1 has been amended to claim that the size of pixel can be designated in accordance with the width of the circuit pattern. This is supported in the last two lines of paragraph 156 on pages 37 and 38 of the specification. In addition, Applicants have stated this in terms of the apparatus that is used to do. Applicants submit that this feature is not disclosed or suggested in the Meisberger et al. Claim 10 which claims this feature as a step is likewise allowable. The art does not suggest setting the pixel size of the display based on the width of the circuit pattern. If in rejecting this claim or any of the others, the Examiner continues to believe that the claim is obvious, citation of a reference to that effect is requested. (*See* MPEP 2144.03: "If the applicant traverses such an assertion the examiner should cite a reference in support of his or her position.")

Claim 2 as originally filed claimed that an SEM image is again obtained by irradiating a charged particle beam. This is supported in paragraph 273 on page 65 by expressing "by clicking the "cluster classification" button 924, ... the SEM image is automatically obtained and displayed again."

The cited reference to Meisberger et al. discloses that an electron beam is irradiated on the same region at plurality of times to increase secondary electron energy and then a concentration of the secondary electrons is accumulated for every pixel of the image. As a result, an S/N ratio is improved. However, Meisberger et al. does not disclose that, after extracting a defect on the circuit pattern included in the SEM image and cluster classifying the defect, the SEM image is again obtained and

displayed. Claim 2 has been amended to better bring this out and now clearly distinguishes over Meisberger et al. Again, this has now been claimed in more structural terms.

The present claim 3 includes a step for again obtaining an image of the defect on the circuit pattern obtained from the comparison result or the SEM image of the defect on the basis of the classification and displaying. These features are explained in paragraphs 273 and 274 on page 65 as the following two points:

> i) After cluster classification, the SEM image of the defect is automatically obtained and displayed again (paragraph 273).
>
> ii) The SEM image obtained upon inspection is stored in the file and then the filed SEM image is displayed again (paragraph 274).

Again, claim 3 has been amended to clearly bring out this feature and distinguish over the art. The Examiner contends that what is claimed in claims 2 and 3 is obvious. Again, Applicants request citation of a reference on this point.

Claim 4 claims that the monitor displays an image signal transmitted from second apparatus in parallel with the display of the defect. This is supported in the description in paragraph 294 on pages 70-71. The paragraph brings out that information from the second inspection apparatus 1024a and both the obtained external information and a result of the SEM type inspection apparatus 1024b relating to the same defect can be compared on the picture plane. Thus, defect information which could not be discriminated only by external apparatus 1024a such as an optical inspection apparatus or defect information which could not be discriminated by only the SEM type inspection apparatus 1024b is displayed on the picture plane or the defect information obtained from both of the apparatuses is overlappingly displayed on the picture plane, and higher precision in the inspection of a circuit pattern

can be obtained. This has been brought out more clearly in the amended claim. This is different from a die to die or die to data base situation. Applicants submit that the references neither alone nor in combination suggest displaying two views of a defect obtained from two different pieces of apparatus.

Claim 5 is directed to simultaneously displaying a map, inspection information and an image of inspection. Claim 11 claims the same feature in method format. To clearly bring this out, claim 5 has been amended to claim "a processor programmed to control said display apparatus such that it simultaneously displays a wafer map display picture plane, an electron beam image display picture plane displaying said defect image stored in said image storing means, and a defect information display region displaying information about said defect displayed in said electron beam image display picture plane." This clearly puts it in apparatus form and brings out the distinguishing feature. The Examiner agreed that this was not shown in the art but indicated he wished to review the issue of obviousness. Based on the current art, Applicants submit there is no suggestion of modifying what is disclosed to reach the claimed combination. Thus, claims 5 and 11 should be allowed.

In claim 9 and corresponding claim 12, two types of apparatus are involved, an inspection apparatus and an observing apparatus. A mark which can be clearly distinguished is made on the image near the defect by the inspection apparatus. Then, the observing apparatus can use this mark to quickly locate the defect. The cited reference to Inokuchi, on the other hand, only discloses detecting positions of foreign matter or defects on the basis of an edge of the wafer.

In contrast claims 9 and 12 use a mark indicative of the position of the foreign matter or defect is written to a location near to the position of the foreign matter or defect allowing it to easily be found.

In view of the above, all claims in this application are now in condition for allowance, prompt notice of which is respectfully solicited.

Attached hereto is a marked-up version of the changes made to the claims by the current amendment. The attached page is captioned **"Version With Markings To Show Changes Made."**

The Examiner is invited to call the undersigned at (202) 220-4200 to discuss any information concerning this application.

Applicants respectfully request a three month Extension of Time to respond to the Office Action of August 24, 2001. The extended period expires February 25, 2002 (February 24th falls on a Sunday).

The Office is hereby authorized to charge the fee of $920.00 for a Petition for Extension of Time Under 37 C.F.R. § 1.136(a) and any additional fees under 37 C.F.R. § 1.16 or § 1.17 or credit any overpayment to Deposit Account No. 11-0600.

Respectfully submitted,

Dated: February 25, 2002

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"Version With Markings To Show Changes Made"

IN THE CLAIMS:

Cancel claims 6-8 without prejudice. Amend the following claims:

1. (Amended) An inspection apparatus for a circuit pattern, comprising:

an irradiating apparatus which is constructed by a plurality of lenses and irradiates light, a laser beam, or a charged particle beam onto a surface of a substrate on which a circuit pattern has been formed;

a detector for detecting a signal which is generated from said substrate;

a memory for temporarily storing the signal detected by said detector and visualized as an image;

a comparing apparatus for comparing said stored signal with a signal obtained by visualizing a corresponding comparison pattern in another region as an image; [and]

a monitor for displaying a defect on said circuit pattern from a result in said comparing apparatus[,];

[wherein a size of each pixel of an image of each of said stored signal and said another signal which is displayed on said monitor is set irrespective of a beam diameter of said charged particle beam]

an input device for designating a size of pixel for use in displaying an image of said defect on said monitor in accordance with the width of said circuit pattern; and

a processor responsive to said input device to set the size of pixel to be displayed on said monitor in accordance with an input from said input device.

Add the following new claim:

10. An inspection method for a circuit pattern, comprising the steps of:

forming an SEM image by irradiating a charged particle beam only once to a surface of a substrate on which a circuit pattern has been formed;

detecting a signal which is generated from said substrate by said irradiation;

storing a signal obtained by said detection and visualized as an image;

comparing said stored signal with a signal obtained by visualizing a corresponding comparison pattern in another region as an image;

designating a size of pixel for use in displaying an image of a defect on said monitor in accordance with the width of said circuit pattern; and

displaying a defect on said circuit pattern obtained from a result of said comparison using said pixel size.

2. (Amended) An inspection apparatus for a circuit pattern, comprising:

an irradiating apparatus which is constructed by a plurality of lenses and irradiates light, a laser beam, or a charged particle beam onto a surface of a substrate on which a circuit pattern has been formed;

a detector for detecting a signal which is generated from said substrate by said irradiation;

a memory for storing the signal obtained by said detector and visualized as an image, said memory storing an SEM image which is obtained by irradiating said charged particle beam only once to one region on the surface of said substrate;

a comparing apparatus for comparing said signal stored in said memory with a signal obtained by visualizing a corresponding comparison pattern in another region as an image; [and]

a monitor for displaying a defect on said circuit pattern from a result in said comparing apparatus[,];

[wherein said memory stores an SEM image which is obtained by irradiating said charged particle beam only once to one region on the surface of said substrate,]

[said apparatus further has] a defect classifying apparatus for extracting a feature of the defect on said circuit pattern included in said SEM image and classifying said defect[,]; and

a processor programmed to cause said monitor to selectively display[s] an image of the defect on said circuit pattern obtained from a result in said comparing apparatus or the SEM image obtained

by irradiating again said charged particle beam to said defect on the basis of a result of the classification in said defect after classifying in said defect classifying apparatus classifying apparatus.

3. (Amended) An inspection method for a circuit pattern, comprising the steps of:

forming an SEM image by irradiating a charged particle beam only once to one region on a surface of a substrate on which a circuit pattern has been formed;

detecting a signal which is generated from said substrate by said irradiation;

storing a signal obtained by said detection and visualized as an image;

comparing said stored signal with a signal obtained by visualizing a corresponding comparison pattern in another region as an image;

extracting a defect on said circuit pattern from a result of said comparison;

extracting a feature of said defect included in said SEM image;

classifying said defect from said feature; and

[obtaining again an image of the defect on said circuit pattern obtained from said comparison result or the SEM image of said defect on the basis of said classification and displaying] displaying said SEM image of said defect extracted from the result of said comparison after said classifying step.

4. (Amended) An inspection apparatus for a circuit pattern, comprising;

a first apparatus of a first type including:

an electron source for generating an electron beam;

an electronic optical apparatus which is constructed by a plurality of electronic lenses and irradiates said electron beam onto a surface of a substrate on which a circuit pattern has been formed;

a detector for detecting a signal which is generated from said substrate by said irradiation;

a defect extracting apparatus for visualizing the signal detected by said detector as an image and extracting a defect on said circuit pattern; [and]

a second apparatus of a second type for examining and extracting the defect from the same circuit pattern;

a monitor for displaying, in parallel, a first image of the defect extracted by said defect extracting [circuit] apparatus, and a second image of the same defect obtained from said second

[wherein said monitor displays an image signal transmitted from another external] apparatus [in parallel with the display of said defect].

5. (Amended) An inspection system for a circuit pattern, comprising:

an electron beam appearance inspection apparatus having irradiating means which is constructed by a plurality of lenses and irradiates an electron beam to a plurality of regions on a surface of a substrate on which a circuit pattern has been formed, secondary signal detecting means for detecting signals which are generated secondarily from said plurality of regions by said irradiation, electron beam image forming means for forming electron beam images of said plurality of regions from said detected signals, image storing means for storing said electron beam images, and a display apparatus for displaying said electron beam images; [and]

an external appearance inspection apparatus having defect image storing means in which a defect image of said circuit pattern has been stored[,]; and

[wherein said display apparatus of said electron beam appearance inspection apparatus simultaneously displays a map display picture plane and an electron beam image display picture plane of said substrate and the defect image stored in said defect image storing means of said external appearance inspection apparatus concerned with the electron beam images stored in said image storing means.]

a processor programmed to control said display apparatus such that it simultaneously displays a wafer map display picture plane, an electron beam image display picture plane displaying said defect image stored in said image storing means, and a defect information display region displaying information about said defect displayed in said electron beam image display picture plane.

Add the following new claim:

11. An inspection method for a circuit pattern, comprising:

a forming an electron beam image by irradiating a charged particle beam onto a plurality of regions on a surface of a wafer substrate on which a circuit pattern has been formed,

detecting secondary signals which are generated secondarily from said plurality of regions by said irradiation,

forming electron beam images of said plurality of regions from said detected signals,

storing said electron beam images,

inspecting said substrate with external appearance inspection apparatus;

storing a defect image of said circuit pattern obtained from said external appearance inspection apparatus, and

simultaneously displaying:

a wafer map display picture plane,

an electron beam image display picture plane displaying information about said defect obtained form said electron beam image, and

a defect information display region displaying information about said defect displayed in said electron beam image display picture plane.

9. (Amended) An inspection system for a circuit pattern, comprising:

an inspection apparatus which has an irradiating apparatus [which is constructed by] <u>including:</u>

<u>a source irradiating light, a laser beam, or a charged particle beam,</u>

a plurality of lenses [and irradiates] <u>directing said</u> light, [a] laser beam, or [a] charged particle beam to a substrate,

a detector for detecting a signal which is generated from said substrate by said irradiation, and

a defect extracting apparatus for extracting a defect on said substrate on the basis of the signal detected by said detector, and <u>for</u> [executes] <u>executing</u> an inspection of said substrate and

[extracts] extracting [the] a defect at the end of a predetermined manufacturing step among a plurality of manufacturing steps of forming a circuit pattern onto said substrate[;],

means for establishing a mark at a location near to a position of the defect detected by said inspection apparatus[,]; [and]

observing apparatus including:

an irradiating apparatus that is constructed by a plurality of electronic lenses and irradiates a charged particle beam onto said substrate,

a detector for detecting a signal which is generated from said substrate by said irradiation, and

an image display apparatus for displaying an image of said substrate on the basis of the signal detected by said detector, said observing apparatus observing said defect existing on said substrate or a part thereof on the basis of a result of the inspection by said inspection apparatus using said marking established at a near location to locate the position of said defect and

transmitting means connected between said inspection apparatus and said observing apparatus, for transmitting said inspection result[,

wherein a position of the defect detected by said inspection apparatus is detected on the basis of a marking adhered at a location where the position of said defect can be known at the time of the observation which is executed by said observing apparatus].

Add the following new claim:

12. An inspection method for a circuit pattern, comprising:

using inspecting apparatus to:

irradiate light, a laser beam, or a charged particle beam onto a substrate;

detect a signal which is generated from said substrate by said irradiation;

extract a defect on said substrate on the basis of the signal detected;

execute an inspection of said substrate;

extract a defect at the end of a predetermined manufacturing step among a plurality of manufacturing steps of forming a circuit pattern onto said substrate; and

establish a mark at a location near to a position of the defect;

transmit the result of the inspection including the defect and the mark to observing apparatus; and

using the observing apparatus to:

irradiate[s] a charged particle beam onto said substrate;

detect a signal which is generated from said substrate by said irradiation;

display an image of said substrate on the basis of the signal detected; and

locate the defect existing on said substrate or a part thereof using said mark.